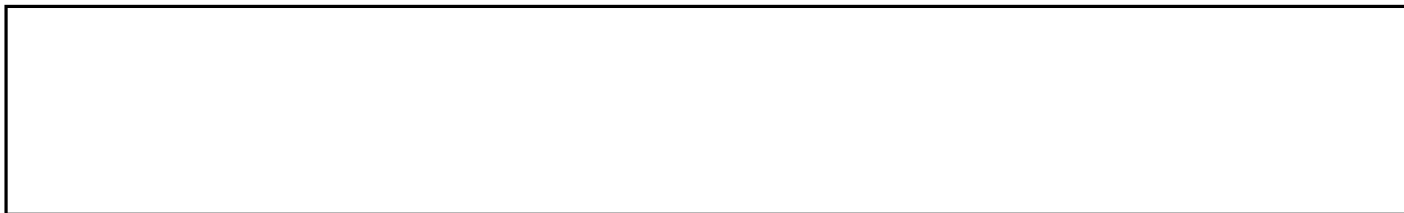


SECRET



September 1, 1970

Attention: John C.

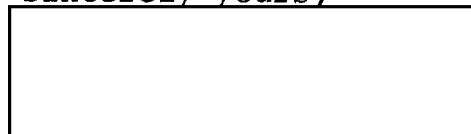
Dear John:

Enclosed please find three (3) copies of ☐ 2201201-TPR-4 dated September 1, 1970.

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Sincerely yours,



Senior Staff Scientist

PSC/c
Enclosures

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SEPARATED FROM CLASSIFIED ATTACHMENTS

Declassification Review by NGA/DoD

SECRET

Copy No. 1 of a-2

[Redacted]

September 1, 1970

To: John C.
 From: [Redacted]
 Subject: Technical Progress Report No. 4
 Contract No. 5226-03
 Reference: [Redacted] 2201201-TPR-4

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This is the fourth monthly contract technical progress report, [Redacted] 2201201-TPR-4, covering the effort performed on [Redacted] from July 20, 1970 to August 20, 1970.

During this past month emphasis was placed on the micro-optical processing program being conducted at the [Redacted] lab facility. A series of image manipulation procedures have been effected in the microscope that will be reviewed here. The macro-optical program being conducted in support of the [Redacted] at the customer facility has been involved with the set-up of the Beck optical bench for image manipulation with a mercury arc source, and with the design of procedures and filters for image manipulation.

The micro-optical program at [Redacted] has implemented image manipulation with the use of transmission filters in the back focal plane of the microscope objective and with variable source diameter controls in the condenser elements. The latter innovation is implemented through the use of a random varying phase field, with positional freedom along the optical axis of a collimated pinhole source. This condenser configuration provides continuous control of

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luminance from high spatial coherence to incoherence. White light is used. The system is being tested with 2X, 4X and 10X objectives. At present the test target being used is a Diffraction Limited resolution target that was photographically recorded in S0380 ON material and subsequently contact printed onto 2430 DP material. All manipulations and their results are being completely analyzed and expectations are confirmed. Improvement in contrast and resolution was obtained. These results are being documented, and the system will be applied to operational type imagery for further evaluation.

The laboratory support program at the customers facility has progressed during this past month. Filters were designed, a program description was generated and the optical bench was aligned and optical components cleaned for operation. This program will be emphasized during the coming months to generate evidence of image manipulation capabilities.

First Milestone

At this time we wish to review the first quarter of the optical image manipulation program, referencing the program schedule in the contract proposal ☐P-70-5 dated February 6, 1970. During the first four months we have implemented the itemized tasks as outlined in the above referenced document. The effort performed during this time period has placed the program slightly ahead of schedule as the literature search, analysis and characterization of filters and methods provided inputs for early implementation of micro-optical image manipulation. The prognosis from this effort is encouraging. Microscope objectives are excellent optical components but when applied to photo-interpreter applications, contrast and grain noise limitations become apparent. It was predicted

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that several gains could be obtained by manipulation of the lens component frequency response. An early start in implementing this was obtained and some preliminary results confirm the predictions. Flexibility in a microscope optical system can yield contrast improvement providing high frequency enhancement. It is concluded at this first milestone of the program that predicted results, substantiated with preliminary tests, meet NPIC requirements.

Enclosed with this report are carbon copies of the lab notebook notes recording some aspects of the lab effort performed during the past month at the customers facility. This, together with activity summaries and program plans generated as a result of the support effort, encompass a complete outline of the effort performed at the laboratory facility.

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September 3, 1970

ACTIVITY SUMMARY

To: John C.
From: [REDACTED]
Subject: Contract Visit to Customer Facility
[REDACTED] 5500-6076) 70R
Date: August 25, 26, 27, 1970
Reference: [REDACTED] 2201201-AS-13

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The objective this week was to further specify the parameters for high pass filters. This was to be done by evaluating results obtained from the processing system on the Beck bench and from previously fabricated filters. The first set of results obtained from the system showed that the system had to be cleaned up.

The remainder of the three days was applied to obtain a clean output. This included changing the microscope objectives before the pinhole, inserting a new 200 Watt Hg lamp and cleaning each of the system components. The complete system was then aligned. The end result showed that 25 and 100 μ pinholes with a 10" collimating lens was too coherent. A 500 μ pinhole proved to give good clean imagery except for the normal noise present in coherent systems. John will fabricate new pinholes between 100 and 500 μ to see if smaller pinholes can be used.

Although the high pass filters were not evaluated this trip, the Beck bench was left at a point where filtering can begin.

MEMORANDUM FOR: *The Record*

Re: [] 2201201-AS-13

[] states the Beck
Bench was left at a
point where filtering could
begin. This is incorrect. The
pinhole was significantly too
large and it was found later
that there was etching
of the antireflection coating
of a transform lens
(DATE)

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